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(56) Documents cited

GB 1458993

EP A1 0025390

EP A2 0078019

(58) Field of search

B8R

Selected US specifications from IPC sub-class B65H

(54) Crash-lock carton magazine

(57) A crash-lock carton magazine slopes upwards and curves towards and beyond the vertical, when the cartoning machine incorporating the magazine in use is in its normally intended attitude of operation; the throat height of the magazine is always less than the height of a carton blank; and, the magazine is shorter at the top than at the bottom so as to create a gap between the first several blanks and the rest of the blanks in the stack.

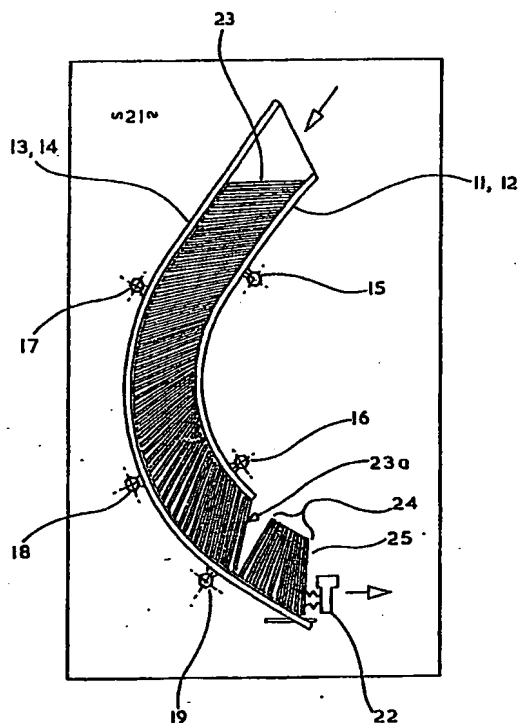


Figure 1

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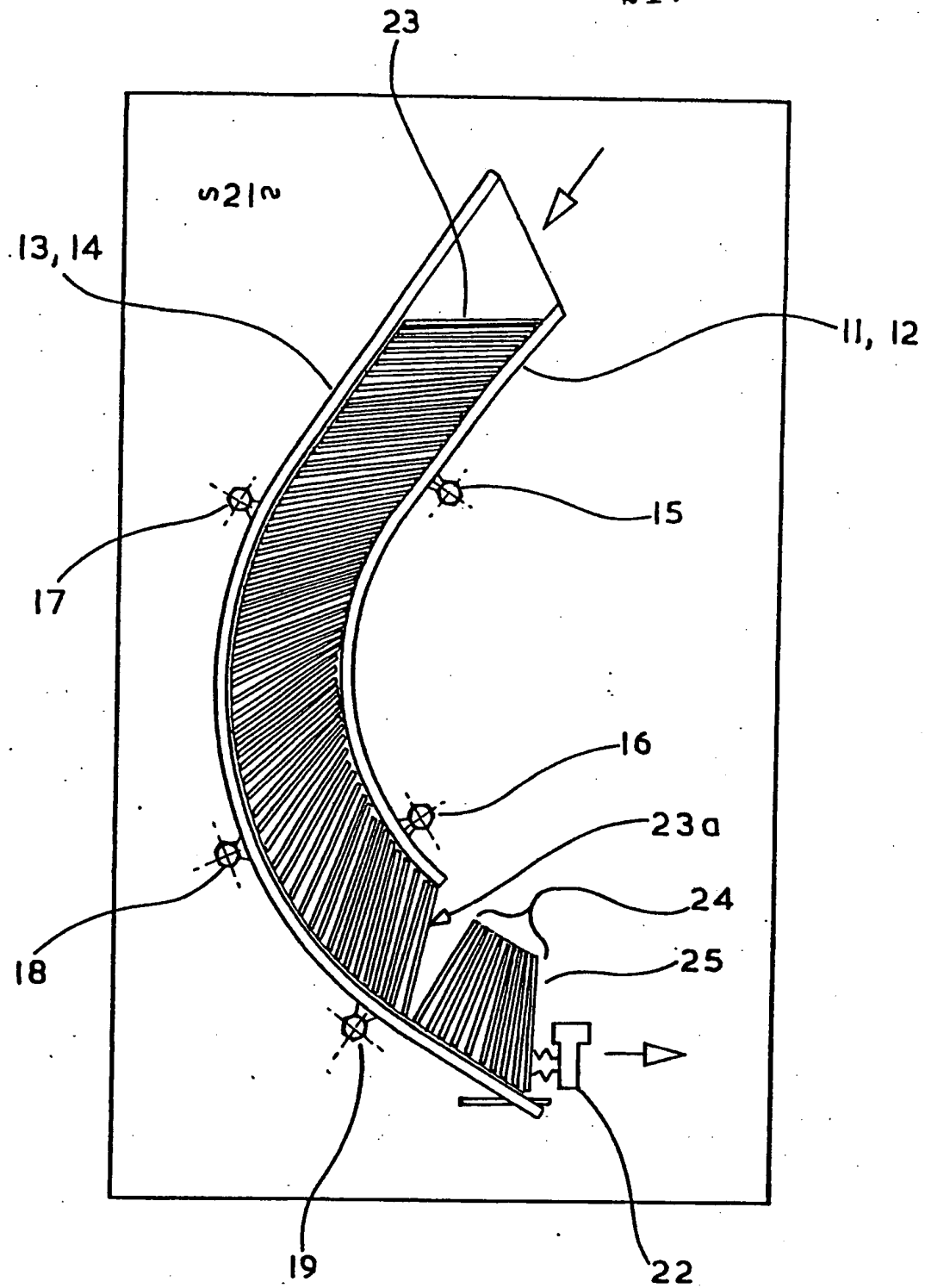


Figure 1

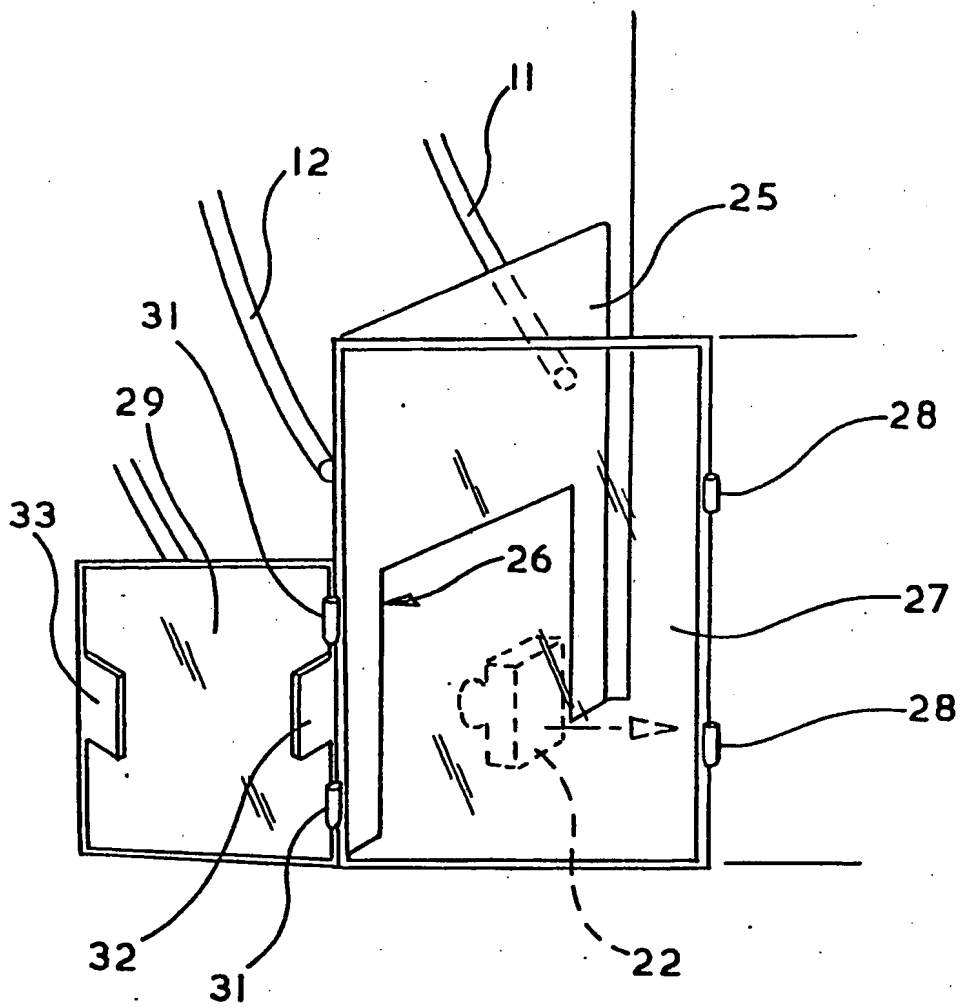


Figure 2

SPECIFICATION

Crash lock carton magazine

5 *Field of the invention*

The invention relates to automated collating and carton loading machines and is specifically concerned with improvements in the carton magazines used with such machines.

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Background to the invention

The problem concerns feeding crash lock carton blanks for automatic erection on a collating and carton loading machine. Such cartons are known in themselves, and are widely used. Traditionally they can be erected from a pre-tucked and folded blank by manual operators. In a high speed automatic machine they are automatically drawn from a magazine by pneumatic suction heads and are erected as they are drawn forward into the cartoner.

The term "crash lock" or "crash erect" is used to describe these cartons, because only a single rapid pull is needed to erect them fully from a substantially flat pre-tucked and folded blank. The pull brings the walls of the blank upright, and the folded floor of the box is automatically formed as this happens.

Conventional thinking is to store a stack of, typically, 40 blanks in a horizontal row in a magazine. The suction heads take the blanks one at a time from the front of the magazine. The magazine has periodically to be refilled. Typically, the 40 blanks are used up in a matter of minutes and the stack has to be replenished frequently by manual operators.

Although the blanks are substantially flat, they in fact taper from bottom to top because there are four thicknesses of cardboard at the bottom and only two at the top. As all the blanks have to be stacked upright one behind another, the tendency is for the blanks to slip down rather than to stand vertically, the farther one goes along the row of blanks from the front of the row. Hence the limitation to 40 blanks conventionally because any more than that would start to slide uncontrollably, in just the same way as the well known tendency of files in a filing cabinet drawer.

To overcome this tendency, and to increase the number of blanks that can be stored in a magazine, it is known to make the magazine in a curve in an attempt to accommodate the tendency of the blanks to fan out as one approaches the back of the horizontal row of blanks. This does increase the number of blanks that can be stored in a magazine, but the number does not increase significantly; because there are limits to the amount by which the curved magazine can extend. If the curve carries on too far, the blanks from the back of the row, as they come round the apex of the curve, will tend to flatten out and turn over and would, therefore, be (at the best) upside down by the time they reached the suction heads.

60 *Summary of the invention*

The invention has the following characterising features. The front part of the magazine (the part nearest the suction heads) slopes upwards and the magazine then increasingly curves towards and beyond the vertical, when the machine is in its

normally intended attitude of use; the throat height of the magazine is always less than the height of a blank; and, as the blanks approach the front of the magazine, the top of the magazine stops short of the bottom of the magazine to create automatically a gap between the first several blanks and the rest of the blanks in the stack.

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Thus the shape of the magazine is such that the bottom surface of the magazine throat locates each carton blank base whilst the top of the magazine throat is used to gradually fan out the tops of the carton blanks, compensating for the tapered shape of each carton; and the attitude of the magazine is such that when fully loaded with carton blanks the full weight of the stack does not directly act on the front group of carton blanks.

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Brief description of the drawings

The accompanying drawings show by way of example one carton magazine embodying the invention. This is not necessarily the best way of putting the invention into practice, but it is one form which the applicants have currently reduced to practice. In the drawings:

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Figure 1 shows the magazine when viewed in side elevation; and

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Figure 2 shows the bottom region of the magazine together with the guards surrounding it, in perspective.

Description of the preferred embodiment

The bars of a series 11, 12 and 13, 14 of curved guide bars are each secured respectively to cross bars 15, 16 and 17, 18, 19 which project from a fixed flat backplate 21 in spaced apart parallelism.

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The thus-supported bars 11 to 14 define a magazine or channel of essentially constant cross section. As *Figure 1* shows, the first or bottom region of the magazine – the region below the level of the cross bar 17 – is curved, whilst the rest of the magazine is essentially straight. The curved bottom region of the magazine is not curved about a single radius. It curves smoothly and progressively about a locus generated from a succession of centres of curvature.

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One pair 11, 12 of guide bars stops short of the continuation of the other pair 13, 14 at the bottom end of the magazine (i.e. the end adjacent the pneumatic suction heads). The suction heads 22 are themselves of known kind and need no further description. They take from the magazine, one at a time, and erect in the process, the crash-lock blanks 23 with which the magazine is filled.

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The spaced guide bars are so located in relation to one another that when the magazine is filled, as illustrated, the front several blanks immediately below the bottom end of the bars 11, 12 jams against that bottom end and a gap 23a is created as a front group 24 of relatively few blanks – typically 15 or so – falls forward against a gate 25 from which the suction heads 22 draw the blanks in the group 24 in succession to erect them.

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As each blank is taken by the heads 22 from the front of the group 24, the front blank jammed beneath the bottom end of the bars 11, 12 automatically falls forward to join the rear of the group 24. This process continues until the magazine is emptied.

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The curvature of the magazine, and the fact that as

illustrated the topmost blanks of the stack 23 are substantially horizontal whilst the blanks in the group 24 presented to the suction heads 22 are substantially vertical, overcomes the previous tendency of the 5 blanks to fall flat and reverse their orientation as they travel round the curve of the magazine. Very many more blanks can be carried and automatically taken by the suction heads 22, without having continually to top up the magazine to prevent the blanks from 10 disorientating themselves as they travel down the magazine towards the suction heads.

The guarding arrangements on the particular embodiment illustrated are important. It is conventional to guard the magazine section of a 15 packaging machine, and to make the guards so that they can pivot open to allow access to the machine when the machine is not working. Figure 2 of the drawings shows how, in the particular machine illustrated, the guarding is so arranged as to enable the 20 operator to top up the magazine with the guard doors closed and (with the guard doors open) to fill the magazine completely, whilst the machine is still working if needs be, and without any undue danger.

A transparent rigid sheet 25 incorporates a cutout 26 and is positioned parallel with the cross bars 15 etc so that the cutout occupies the bottom region of the 25 sheet 25 insitu. The carton blanks pass through the cutout 26 as they are taken one at a time by the suction heads 22.

30 A door 27 in the form of a substantially flat rigid sheet, preferably transparent, is hinged at 28 to a side frame upright (not referenced) of the machine. Another substantially flat transparent sheet door 29 is hinged at 31 to the edge of the door 27 opposite the 35 hinges 28. The door 29 is only just over half the height of the door 27.

Handles 32, 33 are fixed to opposite edges of the door 29. When the handle 32 is grasped and pulled, door 27 swings open about hinges 28; and carries 40 door 29 with it, door 29 then folding flat against the inside of door 27 as door 27 opens fully through 180° to expose the whole of the region containing the bottom end region of the magazine and also containing the suction heads 22.

45 With both doors subsequently closed, handle 33 can be used to open door 29, so giving access to the bottom end region of the magazine, without necessarily opening door 27. In such circumstances door 29 pivots about hinges 31 to open (if opened 50 fully) substantially flat against the outside of door 27.

The means by which doors 27 and 29 latch onto the side frame members of the machine, so as to lie adjacent and so as to guard the bottom end region of the magazine and the region containing the suction 55 heads 22, form no essential feature of the present invention. Suitable latching means can be selected from known alternatives by the reader.

CLAIMS

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1. A crash-lock carton magazine characterised by the features that the front part of the magazine slopes upwards and the magazine then increasingly curves towards and beyond the vertical, when the cartoning 65 machine incorporating the magazine in use is in its

normally intended attitude of operation; the throat height of the magazine is always less than the height of a carton blank; and, with a stack of blanks in the magazine in use, as the blanks approach the front of the magazine the top of the magazine stops short of 70 the bottom of the magazine to create automatically a gap between the first several blanks and the rest of the blanks in the stack; the shape of the magazine being such that the bottom surface of the magazine throat 75 locates each carton blank base whilst the top of the magazine throat is used to gradually fan out the tops of the carton blanks; and the attitude of the magazine in use being such that, when fully loaded with carton blanks, the full weight of the stack does not directly 80 act on the front group (the group comprising the said first several blanks) of carton blanks.

2. A crash-lock carton magazine substantially as described herein with reference to and as illustrated in Figure 1 of the accompanying drawings.

85 3. A crash-lock carton magazine according to Claim 2 and characterised by the features substantially as described herein with reference to and as illustrated in Figure 2 of the accompanying drawings.

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